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ON THE

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT

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REPORT ON THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT

An Analysis of the Central and Southern Florida Flood Control Project

The central and southern Florida project, first phase, was authorized by the Flood Control Act of June 30, 1948, and further monetary authorization was contained in the Flood Control Acts of 1950 and 1954.

Phase 1 consists of most of the works necessary to afford flood protection to the rich agricultural development south of Lake Okeechobee and to the highly developed urban area along the lower east coast of the State. The first phase of the project consists of a system of levees, canals, and water-control structures for rapid removal of floodwaters, storage of water for periods of drought, and prevention of overdrainage and salt-water intrusion. It includes an east-coast protective levee extending from the Homestead area 123 miles north to Lake Okeechobee; partial completion of 3 conservation areas for water impoundment in the Everglades area west of the east-coast protective works with control structures to effect transfer of water as needed; local protective works along the lower east coast; encirclement by a levee and canal of most of the developed portion of the Lake Okeechobee agricultural area; feeder canals; enlargement of Miami, North New River, Hillsboro, and West Palm Beach Canals within the protected area; 3 pump stations at Lake Okeechobee and pump stations at the eastern edge of the protected area on West Palm Beach and Hillsboro Canals; construction of levees on northeast and northwest shores of Lake Okeechobee; enlargement of Lake Okeechobee levees, St. Lucie Canal and related works; and advance planning for the subsequent phases of the comprehensive plan.

Phase 2 of the project, consisting of all remaining works of the comprehensive plan, was authorized by the Food Control Act approved September 3, 1954. As much planning remains to be done on this latter phase, this report will consider only the first phase and the other items of construction on which planning has advanced sufficiently for cost estimates to be made.

HISTORY

At the time that Territorial Florida became part of the United States, in 1821, few white men had ever penetrated the peninsula of Florida. Following that event there was a southward push of settlers from the northern part of the Territory and from Virginia, the Carolinas, and Georgia. Conflicts developing between the new settlers

and the Indians resulted in a 7-year war, costing 1,500 lives and the Federal Government an expenditure of $20 million.

Following cessation of hostilities in 1842 there were hardly 300 Seminoles remaining in the entire lower peninsula.

Congress passed the Army Occupation Act, donating lands in certain districts on condition of actual settlement and cultivation, but few took advantage of it.

In 1845 Florida became a State, and in 1847 one of the State's first Senators, J. D. Westcott, made the earliest known proposal to drain the overflowed lands of the lower peninsula. This was based on reports of Gen. William S. Harney and Gen. Thomas S. Jessup, who had become familiar with the area during the Seminole wars.

The Secretary of the Treasury had caused a survey of the area to be made. A report thereon in 1848 proposed a system of canals and deepening of the various streams that flowed both east and west to the coasts. This would depend upon aid from canals running into the Caloosahatchee, Loxahatchee, and St. Lucie Rivers, basically following the natural drainage already existing.

Florida received 500,000 acres of land for internal improvements at the time she entered the Union, and this was supplemented by Congress through the Swamp Lands Act of 1850, giving the whole of Florida's swamp and overflowed lands to the State. The State acquired a total of 20 million acres, some of it not swamplands. A stipulation of the act was that the sale of land to private interests should finance necessary works of reclamation.

The State created a board of internal improvements in 1851. The register of public lands was charged with the responsibility of locating the lands and of disposing of them to private interests. The offices of State engineer and State geologist were created to direct actual reclamation work.

Little action resulted from this method of handling the problem; first efforts were hampered by poor transportation facilities. In 1855 a new act was passed by the State legislature, creating the trustees of the internal improvement fund. They were given control of the lands and were authorized to guarantee the interest on any bonds that might be issued under its provisions to improve transportation facilities by means of railroads to traverse the area. In addition, a canal from the St. Johns River on Lake Harney to Indian River was approved. The fund had approximately $1 million to finance its operations.

By the time Florida had seceded from the Union some progress had been made. There were then bonds outstanding of over $3½ million. Some railways had been constructed, but much of them were destroyed during the war, and further construction as well as drainage plans in the central and southern portions of the State were held up by the new Indian troubles.

The trustees of the internal improvement fund had a difficult time of it during the reconstruction period. Following many financial maneuvers, principally concerning its railway ventures, it attempted to get the fund out of debt by increasing land sales.

Following many unsuccessful attempts to dispose of the lands on various terms, some requiring improvements, and some for cash only, some 4 million acres were sold to Hamilton Disston for $1 million. This sale, which took place on May 30, 1881, enabled the fund to get out of debt and proceed in the direction of an orderly development of the remaining lands, amounting then to some 10 million acres.

Operations under various companies organized by Disston were varied and met with varying degrees of success. The Atlantic & Gulf Coast Canal & Land Co., and its engineer, James M. Kreamer, most nearly approached the present comprehensive plan. It developed plans for systematically draining large areas as units. The first unit attempted was designed to give Lake Okeechobee an outlet to the gulf through the Caloosahatchee River. A second unit was in the upper Kissimmee Valley, including the cutting of the Southport Canal between Lake Tohopekaliga and Lake Cypress, and the St. Cloud Canal connecting with East Lake Tohopekaliga. This was completed by September 1884, and lowered the level of East Lake Tohopekaliga by 3 feet in short order. By the fall of 1883 the company had opened navigation from the gulf to the town of Kissimmee.

In a report of the company dated 1885 it was stated that $250,000 had been spent on the completion of canals and improvements covering 40 miles, and providing 360 miles of navigable inland waterways. The company had received over a million acres of land for its drainage work. Plans were noted for the improvement of 7 million additional acres. The company continued to be active until 1894, but was unfortunate with experiments at growing sugarcane and work stopped in that year.

With the death in 1896 of Disston most of the activities of his companies ceased or continued on only a small scale.

Disston's operations were important although they did not succeed in accomplishing all that was expected and, in some cases, led to overdraining. However, it was the first large-scale project in the overflowed areas of central and southern Florida, and many of the works are still functioning.

The Federal Government entered the picture with an examination and survey of the Kissimmee-Okeechobee-Caloosahatchee system in August 1899, under the Rivers and Harbor Act of that year. After reviewing much of the old Disston work, the Corps of Engineers recommended to Congress a number of navigational improvements which were undertaken and later completed.

It had become apparent that private efforts were not to be the solution to reclamation of the overflowed lands. In 1905 the State of Florida created a board of drainage commissioners. It then turned over to them the remainder of the lands acquired by the State in 1850. The board was given authority to establish drainage districts and levy taxes thereon of not over 10 cents per acre. Also they were directed to establish a system of canals, levees, drains, dikes, and reservoirs to drain and reclaim the swamp and overflowed lands within the State. In 1907 this State law was ruled unconstitutional by the United States Supreme Court. This resulted in an amendment to the act, which created the Everglades Drainage District, defined its boundaries, authorized it to levy a tax of 5 cents per acre, and authorized the use of funds derived from the tax for use in draining and reclaiming the Everglades.

During the first years of its existence the Everglades Drainage District was engaged in making surveys and engineering plans, although some construction was carried out. Between 1906 and 1913 initial work was accomplished on the Miami, North New River, and South New River Canals. However, it was hampered by lack of funds, since its only sources were sale of land and the 5-cent tax.

In seeking a solution the board of commissioners entered into an agreement with a Florida Everglades Engineering Commission and the trustees of the internal improvement fund in 1913 to make a detailed study of the situation. Its report of October 25, 1913, was subsesequently published as Senate Document No. 379, 63d Congress, 2d session.

THE RANDOLPH REPORT

This report concluded that the drainage of the Everglades was entirely practicable and could be accomplished at a cost commensurate with the value of the reclaimed land. It recommended progressive drainage of the area, noting that the principal problem was the disposition of floodwaters entering Lake Okeechobee from the north. It proposed a canal following the shortest possible route from the lake to the Atlantic Ocean, based on the belief that such a canal could drain the extraneous floodwaters from the lake to the ocean, thus reducing the problem of draining the Everglades to that of disposing of such precipitation as fell directly upon them. Also included were proposals for a series of canals for drainage use, utilizing many canals already in existence and construction of some new ones.

This report was primarily responsible for a reorganization of the Everglades Drainage District by State legislation in 1913. An important change was giving the district the authority to issue bonds based on tax returns, and the tax structure was shifted to one based on benefits.

STATE ACTIVITIES

In the period extending from the reorganization act to 1927 the district was very active. During that period 6 major drainage and numerous minor canals, totaling 440 miles, and some 16 locks and dams, were constructed, at a total cost of $18 million. The funds were derived from sale of bonds issued by the Everglades Drainage District and a special drainage tax levied by the district against the lands within its area of responsibility.

The major canals constructed during this period originate at Lake Okeechobee and flow to the Atlantic, to drain part of the area and to relieve the coastal areas of surplus water. Subdrainage districts were organized to supplement the principal water-control facilities and provide local water-control measures.

Work was slow during the 1920's and came to a halt in 1929, when the Florida land boom collapsed. By 1931 the drainage district had defaulted on its bonds. The hurricanes of 1926 and 1928 also had a deterring effect on developments; over 2,000 people lost their lives and much property damage was suffered as a result of these storms.

The State, in seeking to prevent a recurrence of these disasters, created the Okeechobee Flood Control District, and authorized it to cooperate with the United States Army Corps of Engineers in seeking remedy for flooding conditions largely resulting from tropical rains due to recurring hurricanes.

A recapitulation of State efforts reveals that under the various plans and schemes of operation the Everglades Drainage District had, by January 1, 1929, spent over $17,900,000 to provide drainage and reclamation works. These expenditures had resulted in 468 miles of canals and levees, construction of 16 locks and dams, surveys of 1 million acres of land for the purpose of subdivision. Of this total

about $9,800,000 was spent for drainage, $6,100,000 for flood control, and $2 million for navigation facilities.

Federal Government Enters the Picture

Three reports were made by the Corps of Engineers under authority of various congressional resolutions beginning February 1927. The first report was submitted to the Congress in April 1927. This report recommended that outlets through the Caloosahatchee River and the St. Lucie be improved and proposed construction of a levee at the south end of Lake Okeechobee to prevent the recurrence of such a disaster as that which resulted at Moore Haven in 1926. These works were considered as being of great assistance in the reclamation of 2 million acres of land in the Everglades, and to some extent to the reclamation of lands draining into Lake Okeechobee. The water in the lake would be conserved for use in drought years for irrigation, and as protection against fire and frost. But before any action could be taken the hurricane of 1928 struck, calling for a reevaluation of the report in the light of that experience. Several congressional resolutions called for such action, and the plans were restudied and reworked. Finally, in March 1930, the Corps of Engineers reported to Congress.[1] The River and Harbor Act of July 3, 1930, adopted the project as recommended, with some alterations, which provided for the Caloosahatchee River and Lake Okeechobee drainage areas. It called principally for improving the Caloosahatchee River and Canal, St. Lucie Canal and River, and the construction of a levee and navigation canal following the south shore of Lake Okeechobee, and a levee on the north shore of the lake.

The project was modified by the River and Harbor Act of August 30, 1935, to require the United States to maintain all project works when completed, bear the cost of all drainage structures theretofore and thereafter constructed in connection with the project, and reduce the $2 million previously required by local contribution to $500,000. In the original report of March 1930 the Corps of Engineers had recommended a program of navigation and flood control estimated to cost $9,692,000, of which the State would be required to contribute $3,812,000. The Board of Engineers of the Corps of Engineers pointed out that flood control in the lower Everglades and Miami area was entirely a local problem, not to any great degree dependent upon control of Lake Okeechobee, and that it did not affect any important Federal interest.

The River and Harbor Act of August 26, 1937, modified the project to provide for a new lock in the St. Lucie Canal, at an estimated cost of $806,000. This was substantially completed in 1943 at a cost of approximately $2 million.

In August 1939 the Corps of Engineers, in response to a request for a restudy of the project, recommended raising the Lake Okeechobee levees at a cost of approximately $4 million. Congress did not approve this recommendation.

Meanwhile an event took place which had a major impact on the central and southern Florida project. This was the declaration contained in the Flood Control Act of 1936 of a national flood-control

[1] S. Doc. 115, 71st Cong., 2d sess.

policy when the Federal Government assumed responsibility for controlling floods throughout the country.

Progress Under Federal Programs Since 1930

The Federal project progressed slowly in the years succeeding 1930. Extreme dry spells in 1931 and other years through 1945 resulted in lowered ground-water levels and the serious threat of salt-water intrusion into the sources of municipal water supply for Miami and other coastal cities. The peaty soils of the Everglades were drying out and shrinking; much of it caught fire and was lost. By 1947 it was apparent that simple drainage and building of levees was not the complete answer to the water problems of central and southern Florida. Most of the effort had been directed toward hastening runoff, not retaining it on the land. Following this realization, and the disastrous hurricanes and floods of 1947, a restudy of the entire problem was made.

The district engineer, Corps of Engineers, acting on the request of many local agencies concerned with water problems, and under authority of various congressional resolutions, conducted public hearings throughout the area to determine the needs and desires of the many local interests, and to collect data from which to formulate a plan. It was the sense of these public hearings that the uncoordinated efforts of many agencies in the past had failed to solve the many problems, and that the problem was too large and complex for the State and local agencies to handle. In addition there was no complete agreement as to what was needed. The feeling was that one comprehensive plan of development to cover all phases of the water problem and which would include the entire area would be the only possible solution.

The district engineer of the Corps of Engineers prepared a comprehensive report and submitted it to Congress December 19, 1947. It stated that the problems of flood protection, drainage, and water control were interrelated and that the St. Johns, Kissimmee, Lake Okeechobee, Caloosahatchee, and Everglades drainage areas formed one economic unit. Accordingly the plan as developed was prepared on that basis. The report was published as House Document No. 643, 80th Congress, 2d session. Following congressional hearings the first phase of the comprehensive plan was authorized as part of the Flood Control Act of June 30, 1948.

Following initial authorization of the first phase of the project, construction began in 1950. Costs of the first phase of the project at the time of its authorization were estimated at $68,387,000, of which Federal costs were estimated at $58,129,000 and non-Federal at $10,258,000 cash contribution, plus costs of lands, rights-of-way, operation and maintenance, and relocations. Cost estimates in 1948 for the total project were $208,135,000.

The existing project for central and southern Florida, authorized previous to 1948, was considered as being in the category of "previous projects" by the Corps of Engineers. In the annual report of the Chief of Engineers for 1949 it was reported that approximately $25,746,000 had been spent by the Federal Government on the Caloosahatchee River and Lake Okeechobee drainage areas project to June 30, 1948, and that approximately $2,500,000 remained available on that date.

On February 24, 1949, the Corps of Engineers, testifying at House hearings on the civil functions appropriations bill, estimated Federal cost of the first phase at that time of $58,129,000. They also stated that prior to the expenditures of any funds on the new Central and Southern Florida Flood-Control Project, the Federal Government had spent $25,746,000 for levees and control works constructed on Lake Okeechobee together with its outlet canals, and that the State of Florida, through its agency the Everglades Drainage District, had spent over $18 million on levees, canals, and control structures in the areas south of the lake. It was noted also that local interests had combined and formed some 30 subdrainage districts, and estimated conservatively that over $11 million had been spent on these local works. The 1930 project was considered completed.

On April 28, 1953, during House hearings on civil functions appropriations, a new revised estimate of cost was introduced for the Federal share of the first phase, $96,345,900.

FLORIDA STATE AND LOCAL ACTIVITIES

One of the main features of the project as approved by Congress was the establishment of a heavy State responsibility and requirement of a single State agency for the purpose of dealing with the Federal Government on all matters of local cooperation and responsibilities, as well as acting as a spokesman for the State and local interests. To meet this stipulation the 1949 session of the Florida State Legislature created the Central and Southern Florida Flood Control District as a public corporation, vested with all functions and assets of the Okeechobee Flood Control District, which was abolished.[2] The same legislation provided for the liquidation of the Everglades Drainage District and transfer of all its facilities to the Central and Southern Florida Flood Control District by 1955.

The law creating the flood-control district set forth its boundaries. It includes 15,570 square miles, all or parts of 17 counties. An initial tax was levied on all property within the district.

The primary operational obligations of the Central and Southern Florida Flood Control District are outlined in House Document No. 643, such as the requirement that local interests furnish land, easements, and rights-of-way; establishment and operation of conservation areas (title to land or flowage easements necessary thereto); and to impose and enforce restrictions as to use which will be satisfactory to the Secretary of the Army. It must also furnish, without cost to the United States, the necessary flowage easements over the lands of the conservation areas. Another sphere of activity required of the district, to fulfill the local obligations under flood-control law, is that the district is required to bear the cost of all relocations and alterations of highways and public utilities made necessary by construction of the project. This would include highway bridges and the cost of the lands made necessary by such relocations. Exceptions were made, however, in the case of the enlargement of the Tamiami Trail embankment, and control structures therein, forming the southern levee of the Everglades conservation area. The cost of the latter elements would be borne by the Federal Government, as would that of relocation of railroad bridges.

[2] Ch. 25270.

The cost of maintaining and operating all facilities upon completion was to be the responsibility of local interests, as stated in House Document 643. Such operations are subject to regulation by the Secretary of the Army; however, the Federal Government is to bear the cost of operation and maintenance of the control works, levees, channels, and navigation locks of the St. Lucie Canal, Lake Okeechobee, and Caloosahatchee River. Remaining works of the flood-control plan, except for the control structures between the Everglades conservation areas which will be operated and maintained by the Corps of Engineers, will be operated and maintained by the flood-control district.

In addition to the obligations under House Document 643, the State law creating the Central and Southern Florida Flood Control District has imposed other duties and responsibilities on the district. Another area of responsibility is that of the obligation of undertaking—

> such other works and facilities as the governing board may deem necessary for augmenting, and make more effective use of the works set forth in and as shall be provided under such plan.[2]

The Corps of Engineers is the responsible agency for design and construction of the project. An agency created by the Legislature of Florida, the Central and Southern Florida Flood Control District, furnishes the local cooperation which was stipulated in the enabling legislation. It also cooperates in the development of plans and designs for construction. Close cooperation is maintained with the Corps of Engineers during the planning stages in two ways. First, representatives of the flood-control district hold regular conferences with engineers in the Jacksonville district office of the Corps of Engineers or in West Palm Beach to coordinate each step in the development of project plans. When the final plans are completed, these are referred to the flood-control district engineers for review and acceptance prior to advertising for bids for construction. Second, during the study and design stages of the project, a considerable amount of basic data on economic, social, and physical factors essential to project development is supplied to the Corps of Engineers by the district's division of planning and research.

Concurrent with planning for each step in the overall program, the district is requested formally to acquire the necessary rights-of-way. At this point the legal and land divisions of the district become responsible for all property and right-of-way transactions. This is a very complicated process due to the conditions of land records in the affected area. Following certification of the acquisition of these properties to the Corps of Engineers the construction stage is reached, and bids are sought under regular Corps of Engineer procedure. Meanwhile the district's engineers will have made such arrangements as are necessary for the relocation of highways, public utilities and improvements on public or private property which may be necessary because of interference with works to be built.

As construction is completed on each individual project it is turned over to the flood-control district for operation and maintenance, following such procedures as may be required by or are satisfactory to the Secretary of the Army. As the project progresses, this becomes of greater importance. In addition to operating pumping stations,

[2] Ch. 25270.

drainage canals, and control works so as to maintain desirable ground water levels, providing irrigation water from the conservation areas and from natural lakes, such as Lake Okeechobee, and removing floodwaters to storage or to runoff, the maintenance and operation unit of the district is required to maintain all units in peak operating condition. This also includes some of the older works completed by State agencies during the earlier periods under previous plans. The work also includes water-hyacinth control in the waterways, repair and routine maintenance of new canals and levees, and major and minor repairs to the older system of canals and levees taken over from the now terminated Everglades Drainage District. The district owns a considerable amount of heavy equipment for these purposes.

Another activity of the flood-control district, of increasing importance as the principal elements of the comprehensive plan are completed, is the major system of secondary canals, primarily in the Everglades agricultural area. These are not included in the comprehensive plan. The flood-control district engineers are also available to aid subdrainage districts and other local planning units in making studies and developing designs for the purely local works local units initiate.

The district's engineers have a more urgent responsibility in the planning and supervision of emergency flood-prevention measures and the actual fighting of flood conditions when they occur.

The executive director of the district is its chief administrative officer, and is the representative of the governing board which is appointed by the Governor of Florida.

An important activity of the district is centered in the division of planning and research. This unit is responsible for collecting and supplying the Corps of Engineers and other agencies basic data of value in developing the project, in establishing priorities based on analyses of the economic, social, agricultural, and physical statistics of the area. This is one element which was conspicuously lacking in previous projects.

LOCAL COOPERATION UNDER FLOOD CONTROL ACT OF 1948

The Flood Control Act of 1948 (June 30) required the State to provide all lands, easements, and rights-of-way necessary to the project. A cash contribution of 15 percent of the estimated construction cost for each element of the project was required before work could start. There was a limit of $29,152,000 imposed on the total cash contribution by the State or local interests. The State or local interests were also required to provide assurances satisfactory to the Secretary of the Army that they would hold and save the United States free from damages due to the construction and operation of the works. The flood-control district was also to operate and maintain all of the completed works in accordance with rules and regulations prescribed by the Secretary of the Army with the exception of the levees, channels, locks, and control works of the St. Lucie Canal, Lake Okeechobee, and Caloosahatchee River and the main spillways of the conservation areas. As part of their obligation to furnish lands, easements, and rights-of-way, the local interests were required to provide for the relocation of highways, highway bridges, and utilities.

ANALYSIS OF COST-SHARING PROVISIONS [3]

TABLE 1.—*Summary of cost (H. Doc. 643, 80th Cong., 2d sess.)*

Area	First cost, construction	Lands and relocation	Total	Annual maintenance and operation
Upper St. Johns and related areas	$20,322,000	$703,000	$21,025,000	$75,000
Kissimmee River and related areas	33,750,000	1,116,000	34,866,000	295,000
Lake Okeechobee-Everglades	92,540,000	2,141,000	95,681,000	2,617,000
East coast	52,411,000	3,982,000	56,393,000	716,000
Meteorological and hydrological	170,000		170,000	
Total	200,193,000	7,942,000	208,135,000	3,703,000

TABLE 2.—*Summary of benefits*

	Area			
	Upper St. Johns	Kissimmee River	Lake Okeechobee-Everglades	East coast
Average annual flood damage prevented	$957,000	$990,000	$3,746,000	$2,558,000
Average annual benefits from increased land use	860,000	853,000	9,919,000	3,686,000
Urban benefits		2,000	81,000	454,000
Navigation, fish and wildlife, etc.	31,000	70,000	176,000	190,000
Total	1,848,000	1,915,000	13,922,000	6,888,000
Ratio of part chargeable to increased land use to total (whole project 64.6 percent)	46.5	45.7	71.8	60.2

	Total annual benefits	Total annual charges	Benefit cost ratio
Upper St. Johns and related areas	$1,848,000	$920,000	1.98
Kissimmee River and related areas	1,915,000	1,693,000	1.13
Lake Okeechobee-Everglades area	13,922,000	6,370,000	2.18
East coast-Everglades area	6,888,000	2,960,000	2.32
Total	24,573,000	11,943,000	2.05

Local cooperation

Construction of all project features	$200,193,000
Lands and relocations	7,942,000
Total first cost	208,135,000
Present cost of annual maintenance (3,034,000 at 3½ percent for 50 years)	71,162,000
Total economic cost	279,297,000

[3] This section taken largely from report of Thomas Maddock, Jr., to the Task Force on Water Resources and Power, Hoover Commission, 1954 (?).

TABLE 3.—*Recommendations as to cost sharing (H. Doc. No. 643)* [1]

	Federal share		Local share		
	Amount	Percent	Amount	Percent	Total
1. Cost chargeable to flood control, navigation, fish, and wildlife (35.4 percent):					
35.4 percent of 1st cost	$73,680,000				$73,680,000
35.4 percent of present worth of maintenance	25,191,000				25,191,000
Total	98,871,000	40		60	98,871,000
2. Cost chargeable to increased use of land (64.6 percent):					
64.6 percent of 1st cost ($208,135,000)	53,782,000		$80,673,000		134,455,000
64.6 percent of present worth of maintenance	18,388,000		27,583,000		45,971,000
Total	72,170,000		108,256,000		180,426,000
3. Division of total economic cost	171,041,000	61	108,256,000	39	279,297,000
Of the local share of economic cost	108,256,000				
Deduct following local costs:					
Lands, rights-of-way, and easements			3,898,000		3,898,000
Relocations			4,044,000		4,044,000
Maintenance and operation			71,162,000		71,162,000
Total					79,104,000
Local contribution required					29,152,000

[1] H. Doc. No. 643, p. 53:
"(d) Division of the part of the cost chargeable to increased land use has been made by recognizing the established Federal practice with irrigation projects which results in dividing the 1st cost equally between the Federal Government and local interests; and in charging local interests with costs of maintenance and operation. This has the effect, on the average, over a number of projects, of dividing the total cost (1st cost plus maintenance and operation) approximately 60 percent to local interests and 40 percent to the Federal Government. Accordingly these proportions have been used in dividing the part of the cost of the project chargeable to increased use of land."

The staff report to the Task Force on Water Resources and Power in April 1954 contained some estimates of the cost of bringing land into production. Estimated cost was about $180 per acre, of which about $100 was spent on the Federal project, $65 by the drainage subdistricts, and $15 by the farmer. The staff noted that the figure of Federal cost seemed reasonable, since the land-enhancement portion of the entire project was estimated to cost $134,455,000 and the project develops 726,000 acres of new land and improves 1,575,000 acres of existing farmland. The report noted that it could well be assumed that the final cost of land enhancement would be about 1.65 times the cost assigned to this feature of the Federal project. This closely approximates the situation on Federal reclamation projects where the Federal Government installs all works except those on individual farms.

During the inspection of the project it was found that operation and maintenance costs for subdrainage districts was from $2 to $4 per acre. Thus economic cost of the project, assigning a capitalization total of $58,650,000 to maintenance and operations for subdrainage districts, would be:

TABLE 4.—*Project costs*

1. Construction of all major project features	$200, 193, 000
2. Lands and relcoations	7, 942, 000
3. Construction of secondary works	85, 740, 000
Total first cost	293, 875, 000
4. Present worth of annual maintenance, at 3½ percent for 50 years	71, 162, 000
5. Present worth annual maintenance of secondary works, at 3½ percent for 50 years	58, 650, 000
Total economic cost	423, 687, 000

TABLE 5.—*Allocation of costs*

	Federal	Local	Total
1. Construction of all project features	$171, 041, 000	$29, 152, 000	$200, 193, 000
2. Construction of secondary works		85, 740, 000	85, 740, 000
Total first costs			285, 933, 000
3. Present worth of annual maintenance, at 3½ percent for 50 years (project works)		71, 162, 000	71, 162, 000
3. Present worth of annual maintenance, at 3½ percent for 50 years (secondary works)		58, 650, 000	58, 650, 000
Total maintenance			129, 812, 000
5. Lands, rights-of-way, easements		3, 898, 000	
6. Relocations		4, 044, 000	
Total	171, 041, 000	252, 646, 000	423, 687, 000
Percent	40. 4	59. 6	

It was found, however, that actual costs exceed those contained in House Document No. 643 (figures used in above calculations, or their equivalents). Phase I of the project first costs by 1952 had risen to $116,806,200, of which the Federal and local shares were estimated at $96,345,900 and $20,460,300, respectively.

The Report on Audit of the Accounts of the Central and Southern Florida Flood Control District of January 18, 1954, by the State auditing department of Florida states:

> The cost of acquisition of private lands within the water conservation area was approximately 125 percent greater than estimated in the original comprehensive plan. The cost of acquiring rights-of-way for project works already under Federal construction was approximately 270 percent greater than estimated in the original comprehensive plan. These projects are in relatively unimproved areas. Current estimates of cost of acquisition of rights-of-way for the impending projects within the Everglades agricultural area are 440 percent greater than estimated in the original comprehensive plan.

It is thus apparent that both Federal and local costs have risen. It would appear that the analysis which shows the local interests bearing about 59.6 percent of the economic cost of the project is valid.

The remaining question is whether the benefits have risen commensurately. According to data reviewed by Curran,[4] benefits have risen at a greater rate than costs, the benefit cost ratio of the program in the Lake Okeechobee-Everglades-east coast areas rising from 2.23:1 in 1948 to 6:1 in 1956.

In meeting the requirement for paying operation and maintenance costs chargeable to land enhancement the flood-control district levies

[4] Op. cit.

a tax on property within the district. This now amounts to 1 mill. The 17 counties in the district had an assessed property valuation of $1,468,597,530 in 1953. Tax levies for operation and maintenance purposes in the past were as follows:

1950	$393, 621	1954	$1, 697, 410
1951	987, 100	1955 (9 months fiscal year)	1, 675, 427
1952	1, 088, 925	1956 (estimate)	1, 851, 000
1953	1, 488, 430		

Of the 1953 tax collections, $1,355,320 was collected in the 3 counties of Broward, Dade, and Palm Beach, or 92.1 percent. Counties in the Lake Okeechobee-Everglades, and east-coast areas (Palm Beach, Broward, Dade, Hendry, and Glades) together contributed in tax payments, for the district in 1953, $1,367,334, or about 94 percent of the total. Of the estimated project maintenance and operation costs, of the planned items of the project, approximately 90 percent are to be expended in the same area.

Deducting the costs of collection there were available for project purposes net sums of $1,369,633.20 and $1,013,060.67 for tax years 1952–53 and 1951–52, respectively. Expenditures by the district were as follows:

	1952–53	1951–52
Construction	$1, 552, 074. 83	$746, 872. 32
Acquisition of land and relocations	658, 207. 31	223, 478. 86
Emergency flood control		21, 678. 22
Tax assessor's fees	39, 168. 50	33, 349. 52
Operation and maintenance	302, 564. 61	261, 171. 45
General conduct of affairs	162, 413. 49	149, 382. 90
Total	2, 714, 428. 74	1, 435, 933. 27

Income from which these expenditures were made were as follows:

	1952–53	1951–52
Taxes	$1, 369, 633. 20	$1, 013, 060. 67
State of Florida, flood-control account	1, 715, 499. 75	1, 594, 915. 75
Other income	19, 010. 80	3, 245. 32
Total	3, 104, 143. 75	2, 611, 221. 74

As Federal appropriations have not been great enough to require all of the State money available for matching purposes, money from the flood-control account in the general revenue fund of the State of Florida has reverted to general State use.

Comparison of Federal cost estimates

	Total of authorization estimates (1947 base) (authorized 1st phase)	Planned items and total engineering	
		Latest estimate submitted to Congress (1954 base)	Present estimate (1955 base)
Construction	$49, 720, 000	$95, 326, 000	$97, 827, 000
Relocations	293, 000	661, 600	873, 000
Engineering and design	[1] 3, 836, 000	11, 800, 000	11, 800, 000
Supervision and administration:			
Engineering		1, 600, 000	1, 260, 000
Construction	4, 751, 000	8, 612, 400	8, 240, 000
Total	58, 600, 000	118, 000, 000	120, 000, 000

[1] Includes $600,000 for advance planning.

Source: U. S. Army, Corps of Engineers, planning report, central and southern Florida, January 1956.

BUREAU OF RECLAMATION DETERMINATION OF REPAYMENT OF COSTS

In arriving at the amount of repayment of construction costs by water users on a Federal reclamation project, the United States Bureau of Reclamation determines the water users' ability to pay. This is determined by calculating budgets for representative farm units without irrigation and for optimum size farm units with irrigation. Estimates of farm income are based upon farm production that would be obtained under normal conditions on family-size farms using modern production practices and modern equipment. The normal crop yields at long-term normal prices are calculated to give the monetary return to the water user. From this monetary income (gross) are subtracted the farmers' cost of doing business. Elements included in the latter item are an allowance for interest and capital accumulation equal to 5 percent of the total investment in the farm; depreciation and repair of equipment; labor hire; and operation and maintenance of the irrigation facilities. Available for repayment of costs of the project is the remainder.

From the total construction of the entire project are deducted the nonreimbursable costs, such as those which may be allocated to flood control, navigation, fish and wildlife benefits, water-pollution control, and the like. The remaining costs are to be reimbursed.

The capacity of water users to pay water charges both for construction costs and for operations and maintenance is limited to the increase in their net farm incomes which will result from irrigation.

The basic law under which these calculations are made is the Reclamation Act of 1939.

In general then, it may be stated that of the total cost of construction of a reclamation project that water users may be required to repay to the Federal Government the funds expended for construction, without interest, of the facilities required for irrigation, plus the cost of operation and maintenance, within a period of 40 years following a development period of up to 10 years after water is first made available

for irrigation purposes. This obligation is subject to the limitation noted above, i. e. ability of the water users to pay. In the case of multipurpose projects power revenues may be applied to make up the deficit which water users may not be able to repay. Municipal and industrial water-supply beneficiaries are required to pay in full-plus interest, the cost of such facilities as may be made necessary for that purpose. In some instances the ability of the water users to pay has been such as to permit full repayment by extending the term of years. This and any other variation from the general statement above is of course subject to congressional determination. In recent years there have been many variations, largely due to the greater proportion of multipurpose projects, many of which involve large hydroelectric generating capacities, proceeds from the sale of which have, at the direction of Congress, been applied to repayment construction costs beyond the capability of the water users to pay.

SUMMARY

Of the benefits of the project, as originally outlined in the comprehensive plan, 35.4 percent of the costs of construction is considered nonreinbursable. Despite increased costs since the original estimates the proportion remains approximately the same.

At the time the survey was made, the Flood Control Act of December 22, 1944, had authorized Federal participation in major drainage projects, which had the effect of making reclamation of land one of the primary objectives of flood-control legislation. In applying the general principles of reclamation policy the Corps of Engineers concluded that the policy of providing interest-free funds for construction of reclamation projects and the payment of operation and maintenance charges had the effect of dividing the first cost approximately 60 percent to local interests and 40 percent to the Federal Government. For the purposes of calculating this total cost was considered as being composed of first cost plus capitalized operation and maintenance costs over the useful life of the project.

The obligations of the local interests, in line with the usual Federal policy concerning flood-control projects, were first determined. That is, the cost of land, easements, rights-of-way, and the cost of relocations (the latter with some exceptions to be paid for by the Federal Government). Local interests are also required to pay the cost of operation and maintenance. The difference between the sum of these elements and the 60-percent share to local interests, noted above as being the general experience of reclamation projects, was found to be 15 percent of the total cost of the project. This then became the cash payment required of the local interests. A ceiling was placed on the total amount based on costs calculated in the original comprehensive plan (H. Doc. No. 643), of $29,152,000.

The act of September 3, 1954, which authorized the entire project, would seeingly place this 15 percent cash contribution on a temporary basis for the portion of the project not contained in phase 1 until a final determination is made by Congress.

Central and Southern Florida project: Summarized financial data (as of Jan. 17, 1956)

Estimated Federal cost		[1] $120,000,000
Estimated non-Federal cost		[2] 30,520,000
Cash contributions	$18,900,000	
Other costs	11,620,000	
Total estimated project cost		[1] 150,520,000
Appropriations to June 30, 1955		23,024,000
Appropriation for fiscal year 1956		6,300,000
Appropriation to June 30, 1956		29,324,000
Appropriation requested for fiscal year 1957		5,850,000

[1] This estimate of total cost covers only those units of the comprehensive plan which have been planned in sufficient detail to enable firm cost estimates to be made.
[2] Computed to an interim basis of 15 percent, subject to restudy in accordance with 1954 act.

DATA ON NON-FEDERAL CONTRIBUTIONS

The initial investment required of local interests in construction of the planned items of the project, some of which is on an interim basis pending compliance with the 1954 River and Harbor Act, is currently estimated at, for the fiscal year 1956, $30,520,000, broken down as follows:

Lands and damages	$9,260,000
Relocations	2,360,000
Contribution	18,900,000
Total	30,520,000

Local interests are required to maintain and operate a large part of the project upon completion which includes all works in the east coast and Everglades area except the gated spillways, and all works in the Lake Okeechobee and Everglades area except the features directly controlling and/or protecting Lake Okeechobee. The non-Federal share of the annual cost for maintenance and operation of planned items is estimated at $1,225,700.

In addition, local interests advise that they are now engaged in preliminary planning of the secondary system of channels, and estimate the cost for the Everglades agricultural area as follows:

Secondary channel system	$6,000,000
Land development water-control system	35,700,000

Local interests also have an estimated $2 million program of emergency construction for prevention of damages on which over $500,000 has been spent.

To date the Central and Southern Florida Flood Control District has contributed $4,543,200 toward its share of the project first costs and has agreed to continue to cooperate as the work progresses. In addition, the district has advanced $2,900,000 to accelerate the construction program during fiscal year 1955.

Monetary authorizations to date (July 1955) applicable to the project are $43,300,000.

SOURCES

U. S. Congress. House. Comprehensive report on central and southern Florida for flood control and other purposes. Letter from the Secretary of the Army, transmitting a letter from the Chief of Engineers, United States Army, dated February 19, 1948, submitting a report, together with accompanying papers and illustrations, on a preliminary examination and survey of, and a review of reports on, rivers, lakes, and canals of central and southern Florida for flood control and other purposes, made pursuant to congressional authorizations. May 6, 1948. House Document No. 643, 80th Cong., 2d sess. Washington. Government Printing Office. 1949. 60 pages.

Central and Southern Florida Flood Control District. Central and southern Florida flood-control project. Five years of progress, 1949–54. West Palm Beach, Fla., November 1954. 40 pages.

Commission on Organization of the Executive Branch of the Government. Task force report on water resources and power. Volume 2. Washington, June 1955.

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Golze, Alfred R. Reclamation in the United States. McGraw-Hill Book Co., New York, 1952. 451 pages.

Florida, State Board of Conservation. Division of water survey and research. Information and progress on the central and southern Florida flood-control project. Water survey and research paper No. 10. June 30, 1953. Tallahassee. 73 pages.

Report to the Legislature. Development of the water resources of Florida, 1953–54. April 1, 1955. Tallahassee. 16 pages.

U. S. Army. Corps of Engineers. Planning report, central and southern Florida. Prepared by Jacksonville, Fla., district office. January 1956.

——— Annual reports of the Chief of Engineers. U. S. Bureau of Reclamation. Budget Office. U. S. Army. Corps of Engineers.

Curran, Charles D., Central and Southern Florida Flood Control Project. Legislative Reference Service, Library of Congress, October 29, 1953. 60 pages.

U. S. Bureau of Reclamation. Repayment histories and payout schedules, 1952. 213 pages.

APPENDIX

Rivers and Harbors Act of July 2, 1930

(46 Stat. 925)

Caloosahatchee River and Lake Okeechobee drainage areas, Florida, in accordance with the report submitted in Senate Document Numbered 115, Seventy-first Congress, second session, and subject to the conditions in said document, except that the levees proposed along Lake Okeechobee shall be constructed to an elevation of thirty-one feet instead of thirty-four feet above sea level and shall be so built as to be capable of being raised an additional three feet, and that the United States shall perform the work of constructing all levees: *Provided*, That the State of Florida or other local interests shall contribute $2,000,000 toward the cost of the above improvements, in lieu of the contributions called for in the aforesaid document: *And provided further*, That no expense shall be incurred by the United States for the acquirement of any lands necessary for the purpose of this improvement.

Rivers and Harbors Act of August 39, 1935

(49 Stat. 1032)

Caloosahatchee River and Lake Okeechobee drainage area, Florida: The existing project is hereby modified to provide that the United States shall maintain all project works when completed and shall bear the cost of all drainage structures heretofore or hereafter constructed in connection with said project: *Provided*, That the total cash contribution required of local interests toward the cost of the project shall be $500,000.

Flood Control Act of June 30, 1948

(62 Stat. 1176)

CENTRAL AND SOUTHERN FLORIDA

The project for the Caloosahatchee River and Okeechobee drainage areas, Florida, authorized by the River and Harbor Act of July 3, 1930, as amended, is hereby modified and expanded to include the first phase of the comprehensive plan for flood control and other purposes in central and southern Florida as recommended by the Chief of Engineers in House Document Numbered 643, Eightieth Congress, subject to the conditions of local cooperation prescribed therein, and there is hereby authorized to be appropriated the sum of $16,300,000 for partial accomplishment of said plan.

Flood Control Act of May 17, 1950

(64 Stat. 172)

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $20,000,000 for the prosecution of the first phase of the comprehensive plan for flood control and other purposes in central and southern Florida approved in the Act of June 30, 1948.

Flood Control Act of September 3, 1954

(68 Stat. 1257)

The authorization for the comprehensive plan for flood control and other purposes in central and southern Florida given by the Flood Control Act of

June 30, 1948, as amended, is hereby modified and expanded to include the entire comprehensive plan of improvement as recommended by the Chief of Engineers in House Document Numbered 643, Eightieth Congress, with such modifications thereof as the Congress may hereafter authorize, or, as in the discretion of the Chief of Engineers may be advisable: *Provided*, That the conditions of local cooperation for the authorized first phase heretofore approved by said Flood Control Act shall apply to that authorized first phase, but for all work over and beyond that previous authorization such conditions shall apply on an interim basis only until they shall be modified as deemed appropriate by the Congress: *Provided further*, That whatever conditions of local cooperation are established by Congress as the result of such recommendations shall be retroactive to any units of the comprehensive plan authorized in this Act which may be started prior to establishment of the exact conditions of local cooperation: *And provided further*, That in addition to previous authorizations there is hereby authorized to be appropriated the sum of $7,000,000 for partial accomplishment of said plan.

CONSTRUCTED UNDER PREVIOUS PROJECTS FOR THE OKEECHOBEE WATERWAY AND MAINTAINED UNDER THIS PROJECT

1. Levee, 67.8 miles long, from Fisheating Creek to St. Lucie Canal, following in general the south shore of Lake Okeechobee. January 1932–March 1936.
2. North shore levee, 15.74 miles long. July 1936–February 1938.
3. Spillway at Orona lock. November 1934–August 1937.
4. Four auxiliary floodway channels extending into Lake Okeechobee at or near Liberty Point, mouth of Fisheating Creek, mouth of Kissimmee River, and mouth of Taylor Creek. June 1932–February 1938.
5. Five hurricane gates through the levees at entrance to canals at Clewiston, Lake Harbor, South Bay, Canal Point, and Taylor Creek. November 1933–December 1936.
6. Sixteen drainage culverts through the west-, south-, and east-shore levees, and four similar culverts through the north-shore levee. December 1933–December 1936.
7. Sixteen drainage spillways at drainage openings along the banks of the St. Lucie Canal. November 1934–September 1935.

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